

## Assessing print and electronic use of reference/core medical textbooks

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### INTRODUCTION

One of the earliest lists of recommended medical texts for libraries was Brandon's biennial "Selected List of Print Books and Journals for the Small Medical Library" (later referred to as the Brandon/Hill list), which supported the concept of a "core" collection of essential medical texts [1]. This well-respected list became a standard collection development tool for most medical libraries, and many of the recommended titles were often moved to libraries' noncirculating collections [2]. Given the importance of these titles, it is not surprising that texts from the Brandon/Hill and other essential title lists have been some of the first to appear in electronic format [3].

When Cogdill and Moore studied the resources used by first-year medical students, they found that textbooks were among the most highly consulted, concluding that "librarians serving the information needs of medical students cannot overlook the importance of textbooks, increasingly available in both print and electronic formats" [4]. Levine-Clark found that convenience, remote access, and ability to search within a text contributed to user preference for e-books over print counterparts. In addition, while print was preferred for reading entire books or lengthy passages, e-books were favored when needing to read smaller portions of a book [5]. The features and ease of use afforded by e-books could therefore have an impact on the use of traditional print copies, especially those located in a noncirculating collection.

While comparisons of use statistics between electronic and print formats have been performed, most have focused on academic collections rather than medical title collections. Littman and Connaway conducted a circulation analysis of comparable print and e-books and found e-books received 11% more use than print versions of the same titles; however, the e-books in their study were from netLibrary, which included approximately 50,000 titles covering a broad range of subject areas [6]. In a 1995–1999 study of scholarly online books by Summerfield et al., the electronic versions of reference works showed more use than the print versions. However, only 6 general reference works were included in the study [7]. The current research examines use of e-books in a medical collection to determine if similar trends are observed.

### BACKGROUND

The Medical Sciences Library (MSL) at Texas A&M University (TAMU) is the primary library for undergraduate, graduate, and professional programs in the TAMU College of Veterinary Medicine and Biomedical Sciences and the Texas A&M Health Science Center (TAMHSC), which includes the TAMHSC College of Medicine, School of Rural Public Health, and College of Pharmacy. Until recently, medical students completed only their first two years locally and then relocated approximately eighty miles away to complete their final two clinical years. In the library, core medical texts are integrated with other noncirculating reference materials in a prime location accessible both to client services (public services) staff and library users. The goal of this study was to analyze the reference/core collection to compare use data for print and electronic versions of the same titles. The data could also support decisions about relocating print copies, as well as identify subject areas needing further evaluation due to either increased or decreased usage.

### METHODS

Three resource packages containing e-books (AccessMedicine, Books@Ovid, and MDConsult) were selected to compare with the print reference/core collection. While the library had access to e-books from other packages, these three were selected because their vendors could provide title-specific use data. To obtain a valid comparison between use of the local print reference/core collection, it was necessary to limit the study to e-book collections in which title-level use data could be narrowed down to local authentication.

The list of titles in each package was searched in the library catalog to determine which titles were owned in print and housed in the reference/core collection. The number of titles in each package and the number of those titles that were included in the print reference/core collection are shown in Table 1 (online). The 3 packages had some overlap; thus the final list for this study combined data from duplicate titles, resulting in a set of 51 unique titles to be examined for print versus electronic use. In most cases (48 of 51), use for the same editions of print and electronic books was compared. During the course of the study, new editions of 3 e-books (Current Surgical Diagnosis & Treatment, Ophthalmic Drug Facts, and Williams Hematology) became available prior to the library updating its print reference/core copy, so data for the new and previous electronic editions were combined.

Use statistics were collected from vendors over a fourteen-month period (spanning 2005–2006) from the three electronic resource packages. For the same titles in the print reference/core collection, the integrated library system, Voyager, provided use data collected via sweeps of the reference area several times per day, during which staff electronically scanned books before reshelving them. Data from online use and print use were entered into a spreadsheet for further analysis.



Supplemental Table 1, Figure 1, and an appendix are available with the online version of this journal.

**Table 2**

Total electronic and print use by package: 2005–2006

	Total use* of e-books included in the study	Total use of same titles in print
AccessMedicine	8,658	76
Books@Ovid	2,103	158
MDConsult	1,371	54

\* Vendor-supplied data.

As noted, for titles that were in two different electronic packages, use data were combined to calculate the total online use from all electronic sources. The compiled data were analyzed by package, by total online use, and by total print use.

## RESULTS

All 51 examined titles (Appendix online) were used more frequently in electronic format than in print. The total use for electronic editions of all titles from 2005–2006 was 12,132, while print use totaled 278. The titles included in this study largely represented key texts, as evidenced by 80% (41 out of 51) of them appearing on the final Brandon/Hill list issued in 2003 [8]. However, totals for electronic usage varied quite a bit among the 3 packages (Table 2). In addition, use among the 2 titles that appeared in more than 1 package also differed somewhat. Current Diagnosis & Treatment in Cardiology, offered in both AccessMedicine and Books@Ovid, had higher use via AccessMedicine ( $n=127$ ) than Books@Ovid ( $n=77$ ). Williams Hematology, also offered in AccessMedicine and Books@Ovid, showed the reverse: higher use via Books@Ovid ( $n=144$ ) than AccessMedicine ( $n=0$ ).

## DISCUSSION

This study focused on use of e-books versus printed books in the reference/core collection to help plan the future of the onsite reference/core collection and to provide data to assist in collection development and retention decisions. Use data also informed renewal decisions for electronic resources, providing evidence to justify costs and the particular mix of titles selected.

This study of strictly medical e-books aligns with other studies of use of e-books versus print versions of the same titles. As noted, users readily access e-books when they need to read small portions [5]. Considering that medical books are not typically read cover-to-cover in a single session, the electronic format seems perfectly suited for searching and retrieving relevant sections of such resources. Analysis of the data overwhelmingly indicates higher use of the electronic format, as illustrated in the representative sample of titles shown in Figure 1 (online). Given the limited numbers of third- and fourth-year medical students onsite at MSL, purchasing has been highly selective for print materials in clinical areas. Results of the study revealed use of print clinical titles is quite low, while use data for the e-book versions of the same titles are

surprisingly high. Because students in their clinical years, as well as faculty and staff, are accessing materials from remote locations, e-books seem to benefit this geographically dispersed group. It is also possible that the high-use data reflect use by local medical students and other campus users who have discovered the availability and convenience of electronic versions. The sharp contrast in use of electronic over print textbooks offers an area of continued research into specific reasons for user preference.

Current use data collection methods cannot ensure that users' information needs were met. Noted weaknesses of the sweep method that could lead to underestimating usage include the inability to account for users who reshelve materials and multiple uses that occur during the time that materials remain unshelved [9]. Both the print and electronic environment allow the possibility that users may access a reference book and find that it does not contain the information they need. Page or physical retrieval does not necessarily indicate a "use," because every use does not necessarily mean a match to an information need. The use data from electronic packages can give the appearance of precision, but it is still not possible to know if the retrieved page resulted in a satisfied user and could result in overestimating usage. In addition, during the course of the study, three e-books were replaced with newer editions, but because the focus of the study was comparing the use of a title in the two formats, the data were simply combined to calculate the total online use.

Use of an electronic resource may also be affected by the available interface and use restrictions; for example, simultaneous user limits (seat limits) can dictate resource choices. Seat limits vary depending on the license agreement, and, in the case of this library, the three analyzed packages had some distinct differences. AccessMedicine had a limit of two simultaneous users, and MDConsult had a site license that allowed an unlimited number of simultaneous users. The license that MSL had for Books@Ovid allowed access to the service by ten simultaneous users but limited access to any specific title to only one user at a time.

User turnaways would definitely impact the e-books accessed in a package. While more than one simultaneous user allows for greater access than a single print copy, it is important to monitor whether seat limits are sufficient. Turnaway reports were not analyzed in this study. Counter intuitively, though, AccessMedicine with just two seats showed the highest use, and MDConsult, with unlimited access, received the lowest use among the three analyzed e-book packages. As noted, use among the two titles (Current Diagnosis & Treatment in Cardiology and Williams Hematology) that appeared in more than one package also differed, but it was difficult to determine the reason, such as whether users preferred the interface of one platform over the other or whether the additional features in AccessMedicine, such as patient information and linking to point of care tools, led to the higher use.

## CONCLUSION

Documented higher use of electronic materials versus their print counterparts is an important factor in collection development and physical location decisions. If the goal of the reference/core collection is to provide greater access, then e-books seem much more successful at accomplishing this. Whereas in the past, the best way to guarantee access was to collect materials in a place at the heart of the library, electronic access makes physical location less of an issue. In MSL's case, the overwhelmingly high use of e-books led to the decision to designate the e-book version as the primary reference copy and relocate the print version to the stacks for circulation. Use of these circulating copies will be monitored to determine the need to update print copies. The library will continue to seek out appropriate materials in electronic format to support the strong user preference for e-books and shift from print. New born-digital resources, such as evidence-based medicine tools (e.g., DynaMed, FirstConsult and InfoPOEMs), may ultimately become the reference/core collection of the future.

This study's evidence clearly demonstrates that a physical print reference/core collection receives far less use than its electronic equivalent. With such use, the library's goal shifts to finding more ways to bring these materials to users' desktops in a multitude of locations and to ensuring reliable, consistent access. It also becomes increasingly important to adequately promote these electronic resources and instruct users in how to locate and use them.

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## Systematic searches for the effectiveness of respite care

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## INTRODUCTION

Evidence-based assessment of the effectiveness of interventions is increasingly being adopted in disciplines beyond medicine [1, 2], and a particular area of interest is social care (care that helps people with daily living, personal care, and independence) [3-5]. The resulting increase in the demand for systematic reviews of the effectiveness of social care interventions [1, 2, 6] is challenging for systematic reviewers, particularly regarding how to best identify appropriate evidence for inclusion [1-4, 7-8]. A range of databases can provide evidence on the effectiveness of social care interventions [1, 2, 9], including general medical databases (e.g., EMBASE and MEDLINE) and the increasing number of databases available that focus on social care (e.g., Sociological Abstracts and Social Services Abstracts). Systematic literature searches of the evidence in this field are problematic for two reasons: the optimal number and combination of databases is unknown [1-4, 7-9] and the creation of combinations of search terms that retrieve all the relevant references is difficult [1, 2].

The selection of search terms in social care topics is also problematic due to variations in the terminology



This article has been approved for the Medical Library Association's Independent Reading Program <<http://www.mlanet.org/education/irp/>>.



Supplemental Tables 1 and 2 and Figures 1 and 2 are available with the online version of this journal.



used, the country of origin, and changes over time [1]. For example, although the term "carer" is often used in the United Kingdom, terms such as "caregiver" or "caretaker" are used in the United States. In addition, phrases such as "children caring for their elderly relatives" or "husbands supporting their wives" can be substituted for "carer." The use of different definitions of "carers" can also impact the searching process. For example, some definitions include paid workers, while others include only volunteers. To identify papers relating to paid caregivers terms such as "health personnel," "care worker," or "health care assistant" may be appropriate, while for volunteers terms such as "neighbor," "friend," or "spouse" are more appropriate.

With a wide range of potentially useful databases and a lack of standardized terminology, searching a large number of databases with broad search strategies encompassing many variants of the terminology seems the most effective way to ensure identification of most of the relevant studies. However, this approach may also retrieve large numbers of irrelevant records. The aim of this study was to ascertain the relative contributions of a range of potentially useful databases and other sources for identifying evidence for a systematic review of social care.

## METHODS

This study examined which resources (e.g., databases, hand searching) yielded references used in a recent systematic review of the effectiveness of respite care for carers of frail older people [10]. The original review was conducted according to published guidance [11].

### Search strategy

To identify relevant papers for the original review on respite care, reviewers searched a range of databases with medical and/or social care content, as well as databases of different types of publications (e.g., gray literature and conferences) and studies (e.g., economic evaluations and randomized controlled trials [RCTs]) (Table 1 online). Studies were also sought by checking references, searching citations of key papers, and contacting authors and organizations [10].

The review question comprised three search facets: "carers," "frail elderly," and "respite care." After many search iterations, the review team decided that the search strategy should focus on the search facets "carers" and "respite care" and not include search terms for "frail elderly," as the team's previous experience [12] and exploratory searches indicated that some relevant references did not specify any age category in the bibliographic records. To capture as many of the relevant records as possible and overcome the variation in terminology for "carers" and "respite care," the search strategies incorporated many different synonyms for these terms (Table 2 online). The search strategy was adapted for use in each database.

## Retrospective analysis

In the retrospective analysis reported here, the authors recorded whether all of the original review's references were identified in each resource, using the search strategy described above. The authors also conducted simple searches in the resources for the citations included in the original review to identify whether they were available in each resource at the time of searching. To establish if each record was available at the time of searching, the entry date of the record was compared to the date of the original search. For references available in a database but not identified by the original review's search strategy, the bibliographic record of the reference was examined for terms or phrases used to denote "carers" and "respite care" in the title, abstract, or indexing to determine why it had not been identified.

The sensitivity, precision, and number needed to read (NNR) were calculated for the search in each of the databases. NNR is an index of how many records need to be read to find one included record. The authors used the following definitions:

$$\text{Sensitivity} = \frac{\text{number of included records}}{\text{total number of included records}} \times 100$$

$$\text{Precision} = \frac{\text{number of included records retrieved}}{\text{total number of records retrieved}} \times 100$$

$$\text{NNR} = \frac{\text{total number of records retrieved}}{\text{number of included records retrieved}}$$

The minimum combination of databases required to identify all included studies was recorded. This analysis was also repeated with the subset of included RCTs.

## RESULTS

### References examined for the original review

The searches for evidence for the systematic review on respite care retrieved 13,092 unique records (25,374 before deduplication), and an additional 3,768 records (before deduplication) were retrieved from searches for ongoing studies. Searches in PsycINFO provided the greatest number of records, followed by MEDLINE and AgeLine (Table 3).

Forty-four references were included in the systematic review: 57% (25/44) were RCTs; 30% (13/44) were quasi-experimental design (i.e., non-randomized controlled studies, where the control group may, for example, have been taken from a different geographic area and matched with the intervention group by age, gender, or clinical characteristics); and 14% (6/44) were uncontrolled studies. More than a third (16/44) of the included studies included an economic evaluation.

Most of the included references (37/44, 84%) were published as journal articles, 7% as books or book

**Table 3**  
Sensitivity, precision, and number needed to read for each database

Database	Total number of records retrieved by the search strategy	Number of included records retrieved by the search strategy	Sensitivity of search strategy (n=44)	Precision of search strategy	Number needed to read (NNR=1/precision)
PsycINFO	3,306	15	34.09%	0.45%	220
MEDLINE (including in process)	2,880	25	56.82%	0.87%	115
AgeLine	2,451	24	54.55%	0.98%	102
EMBASE	2,229	15	34.09%	0.67%	149
National Research Register (NRR)	2,154	0	—	—	N/A
CINAHL	1,998	11	25.00%	0.55%	182
Social Science Citation Index (SSCI)	1,839	18	40.91%	0.98%	102
ESRC SocietyToday Database	1,204	0	—	—	N/A
Health Management Information Consortium (HMIC)	1,179	5	11.36%	0.42%	236
AgeInfo	855	9	20.45%	1.05%	95
Applied Social Sciences Index and Abstracts (ASSIA)	781	5	11.36%	0.64%	156
Caredata	655	5	11.36%	0.76%	131
Social Services Abstracts	635	5	11.36%	0.79%	127
Sociological Abstracts	435	0	—	—	N/A
Allied and Complementary Medicine Database (AMED)	419	4	9.09%	0.95%	105
Cochrane Central Register of Controlled Trials (CENTRAL)	348	18	40.91%	5.17%	19
British Nursing Index (BNI)	313	3	6.82%	0.96%	104
Meta Register of Controlled Trials	254	0	—	—	N/A
Cochrane Database of Systematic Reviews (CDSR)	219	0	—	—	N/A
Health Economics Evaluation Database (HEED)	201	1	2.27%	0.50%	201
ISI Proceedings: science and technology	153	0	—	—	N/A
Research Findings Electronic Register (ReFeR)	136	0	—	—	N/A
International Bibliography of the Social Sciences (IBSS)	122	0	—	—	N/A
NHS Economic Evaluation Database (NHS EED)	115	1	2.27%	0.87%	115
ISI Proceedings: social sciences and humanities	101	0	—	—	N/A
Internet Documents in Economics Access Service (IDEAS)	76	0	—	—	N/A
Social, Psychological, Educational and Criminological Trials Register (C2-SPECTR)	71	0	—	—	N/A
System for Information on Grey Literature in Europe (SIGLE)	63	0	—	—	N/A
Database of Abstracts of Reviews of Effects (DARE)	54	0	—	—	N/A
Inside conferences	47	0	—	—	N/A
Index to Thesis	25	0	—	—	N/A
Dissertations Abstracts	20	0	—	—	N/A
Clinicaltrials.gov	20	0	—	—	N/A
Health Technology Assessment database (HTA)	14	0	—	—	N/A
EconLit	2	0	—	—	N/A
Interventions and Policy Evaluation (C2-RIPE)	Browsed	0	—	—	N/A

chapters (3/44), 5% as dissertations (2/44), 1 as a report, and 1 as a conference abstract.

### Sources of included references

**Where were the references available?** Executing individual searches (e.g., author name, title word) in the resources for each of the references included in the original review, the authors found that 18 of the 36 databases contained at least 1 included reference at the time of searching (Figure 1 online): MEDLINE contained the highest number of included references (30/44, 68%), followed by Social Sciences Citation Index (SSCI; 26/44, 59%) and AgeLine (25/44, 57%). Four databases contained 1 unique reference, each at the time of the original searches for the systematic review: AgeLine, EMBASE, PsycINFO, and SSCI. Three included references (1 book chapter, 1 conference abstract, 1 dissertation) were only available by checking references or contacting authors. The minimum combination of sources that contained all the included references was AgeLine, EMBASE, Health Management Information Consortium (HMIC), MEDLINE, PsycINFO, SSCI, reference checking, and author contact.

**Where were the references identified by the search strategies used in the original review?** In the majority of the databases, the search strategies failed to retrieve all the included references available in that database (Figure 1 online), due to the bibliographic details containing:

- no carer terms (ten records)
- no respite terms (six records)
- ambiguous carers terms (two records) (e.g., “families of the aged”)
- ambiguous respite care terms (five records) (e.g., “practical and emotional help” or “support strategies”)

Fourteen bibliographic records contained no abstract, and two a limited abstract. Unique references (i.e., items available in only one of the searched resources) were identified by the search strategies used in the systematic review in four databases: AgeLine (two records), EMBASE (two records), PsycINFO (two records), and SSCI (one record).

The minimum combination of sources to retrieve all the included references *with the search strategies used in the systematic review* was the same combination of sources that contained all the included references:

AgeLine, EMBASE, HMIC, MEDLINE, PsycINFO, SSCI, reference checking, and contacting authors.

### Search strategy precision

The precision of the search strategies in the majority of the databases was very low (Table 3). The Cochrane Central Register of Controlled Trials (CENTRAL) had the highest precision (5.17%), meaning that approximately 19 records would need to be read to retrieve 1 included reference. Specialized databases relating to the elderly had low precision (AgeInfo, 1.05%; AgeLine, 0.98%).

### Sources of included randomized controlled trials (RCTs)

**Where were the RCTs available?** Over half of the included references were RCTs (25/44, 57%). Fifteen of the 36 databases contained at least 1 included RCT at the time of searching (Figure 2 online). MEDLINE contained the greatest number of included RCTs (20/25), followed by AgeLine (18/25) and CENTRAL (18/25) (Figure 2 online). Unique included RCTs (i.e., RCTs only available in 1 resource) were available from searching AgeLine, by checking references, and by contacting authors.

The minimum combinations of sources that contained all the included RCTs were AgeLine, reference checking, and contacting authors plus:

- a. MEDLINE and EMBASE
- b. CENTRAL and MEDLINE
- c. CENTRAL and EMBASE

**Where were the RCTs identified?** In most databases, the search strategies failed to retrieve all the included RCTs available in that database (Figure 2 online). The minimum necessary combination of sources to retrieve all the included RCTs with the search strategies used in the systematic review was the same combination as those that contained all the included references: AgeLine, reference checking, and contacting authors plus:

- a. MEDLINE and EMBASE
- b. CENTRAL and MEDLINE
- c. CENTRAL and EMBASE

The combination of AgeLine, CENTRAL, and EMBASE plus reference checking and contacting authors had the highest precision and 100% sensitivity.

## DISCUSSION

### Databases

Post-hoc analysis demonstrated that complete retrieval of included references for a systematic review on respite care could be achieved by searching six databases plus reference checking and contacting authors. The six databases that needed to be searched to identify all the included references for this systematic review were two first-line health databases (EMBASE, MEDLINE), three specialist databases (AgeLine, HMIC, and PsycINFO), and a social science database (SSCI). This range of databases probably reflects the multidisciplinary

nature of the topic, which is typical of reviews of social care [2, 11]. These results also reinforced the results of other studies outside the traditional medical arena that have indicated the value of searching more than one or two databases [6, 13–15].

The minimum number of sources needed to retrieve all included RCTs was easier to predict: CENTRAL, MEDLINE, and EMBASE are suggested as the best sources [16–18]. Searches beyond these databases are sometimes recommended [15, 19–21], and the value of searching specialist databases dependent on the topic has also been emphasized (e.g., PsycINFO for mental health topics [4], the Transport database for transport topics [8], AgeInfo for home care services for older people [1], and CINAHL for nurse related topics [22]). These results were similar to those of Bayliss et al., who found that the minimum combination of databases to identify RCTs for a psychological intervention was a specialist database (PsycINFO) plus CENTRAL, EMBASE, and MEDLINE [4].

The usefulness of reference checking, contacting experts, and other more serendipitous means of identifying relevant information has often been emphasized [20, 23–25] and is supported by the current retrospective analysis: both reference checking and contacting authors produced at least one unique reference included in the review.

### Search strategies

Despite using a very broad search strategy, with many synonyms for “carer” and “respite” terms and no restrictions with “frail” or “elderly” terms or by study design, most of the searches did not retrieve all the available included references, demonstrating the variability in the use of terms for social care concepts. It also indicates the value of including abstracts in citation records and appropriate indexing: many of the records that were missed by the database searches for the systematic review did not have an abstract and/or appropriate indexing terms.

### Limitations

The current study is limited to one systematic review, so generalizability of the results has not been tested on other systematic reviews. In addition, the analysis did not take into consideration the impact on the results of the systematic review if some of the studies had not been identified (e.g., if only MEDLINE had been searched, would the review conclude differently on the effectiveness of respite care?).

To accurately predict the ideal combination of databases identified in the current retrospective analysis would be virtually impossible and is unlikely to be generalizable to other areas of social care. However, analyses of other systematic reviews in similar topic areas are still recommended as, although they are unlikely to uncover a definitive set of databases to search for evidence in systematic reviews of social care, they may provide a useful insight into which databases fre-



quently contain or rarely contain included references, allowing for more efficient use of searching effort.

## CONCLUSION

It is widely accepted that search strategies for systematic reviews of social care interventions should contain a range of synonyms and few limits to increase sensitivity [2]. The current study demonstrates, however, that information professionals need to be aware that even sensitive search strategies with a broad range of synonyms may not identify all the references meeting the inclusion criteria that are available in a particular database. Searching a number of different sources is likely one key way to compensate for these issues.

This paper also demonstrates that a systematic review of a social care topic may require a range of databases covering different disciplines. Reference checking and contacting authors are also valuable sources of unique relevant references and provides materials not available through the use of databases.

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## Helping a dental school put the "e" in evidence-based dentistry\*

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## INTRODUCTION

Evidence-based dentistry (EBD) was officially recognized in the United States in 2001 with the adoption of the *American Dental Association's (ADA's) Policy on Evidence-Based Dentistry*, which provided a definition of EBD and clearly defined guidelines. EBD's recognition has since grown, and, in 2006, ADA's representative, Daniel Meyer, stated, "the need for an evidence-based approach to oral healthcare and the practice of dentistry is greater than ever" [1]. In this spirit and in the same year, the Alumni Medical Library at Boston University joined the Boston University School of Dental Medicine's (BUSDM's) initiative to strengthen the role of EBD in its curriculum. The library's efforts fo-

cused specifically on the first two steps of the ADA's EBD process: (1) defining a clinically relevant question and (2) conducting searches for evidence [2], as these steps call for library-related information skills. This article describes the role of the library in helping BUSDM faculty and students find the evidence to be successful EBD practitioners.

## LIBRARY INTEGRATION PROPOSAL AND COURSE PREPARATION


In preparation for increased collaboration with BUSDM, more than 200 print and electronic dental books were added to the library's collection. Prior to this expansion, the education librarian met with the BUSDM associate dean for academic affairs in February 2006 to learn more about the BUSDM curriculum and inform purchasing. Guided by the ADA's emphasis on the 2 library-related EBD steps, the librarian also presented a detailed lesson plan for a possible basic library skills training designed for first-year dental students. The lesson plan mirrored the type of course proposal a BUSDM faculty member would submit, complete with learning objectives, hands-on activities, and training logistics. Although librarians commonly create such lesson plans at Boston University, it was especially important in this case because they were hoping to request course hours for the training and wanted to demonstrate that the librarians could be held to the same standards as BUSDM faculty. Lastly, while preparing for the meeting, the librarian performed an Internet search that revealed the dean's significant involvement in ADA EBD activities and his strong support for initiatives that foster lifelong learning, interests that the proposed training would support.

The dean was receptive to the collection expansion and the plan for introducing library training to the student curriculum. In line with professional experience in libraries demonstrating that information literacy training is most effective when it is integrated into a curriculum [3], the dean suggested expanding the library's role in the fall of 2006 through partnering with the mandatory first-year course, "Evidence-based Dentistry" (course outline in Table 1 online).

## MEETING WITH THE COURSE FACULTY

The EBD course has been offered since 2000 and is led by a well-respected course director who had several valid questions about integrating an information skills session into their established course. These initial concerns were addressed in several joint meetings between the librarians and course faculty. The first concern regarded incorporating a 90-minute training session into an already packed curriculum. Fortunately, the dean quickly added the necessary time to the course, eliminating any adjustments to existing course content. The course director also questioned whether the students would take the session seriously. To address this concern, the librarians and faculty added an in-class assignment to the library training worth 10%

\* Based on a presentation at MLA '07, the 107th Annual Meeting of the Medical Library Association; Philadelphia, PA; May 20, 2007.

 Supplemental Table 1 and an appendix are available with the online version of this journal.



of the student's final grade. The librarians readily integrated the assignment, agreeing that it would help focus the students. The training was also structured to emphasize the importance of information skills for a practicing dentist, thereby reinforcing the workshop's lasting value and importance to students who would potentially be distracted by more immediate course concerns.

## PREPARING FOR THE LIBRARY TRAINING

To complement the EBD course and emphasize its key principles, the librarians made modifications to the original lesson, which ranged from updating search examples to integrating an in-class assignment. These modifications were implemented in coordination with BUSDM faculty, which allowed both groups to leverage each other's subject expertise. For example, to guide the librarian's search examples, faculty wrote a case that described a pregnant woman with periodontal disease and her potential increased risk of delivering a low-birth-weight child. Throughout the case-development process, the faculty consulted with the librarians to ensure that issues arising in the material were compatible with available resources such as MEDLINE.

Similarly, as the librarians modified their lesson plan, they sought faculty feedback to ensure that the content was appropriate for the students. For example, as search terms were selected for examples drawn from the case study, the librarians verified these terms with the faculty to ensure that they would be understood by students just beginning their dental training.

The librarians' expertise was also utilized in creating online forms to capture in-class assignment submissions. This collaborative relationship was especially valuable as it allowed misunderstandings to be immediately addressed. For example, at first, the faculty were uncomfortable with the amount of time the librarians' lesson plan dedicated to general library skills, such as online catalog searching, and asked for a focus on journal literature to complement the EBD skills, such as critical appraisal and study design, introduced in the course. Through communication and revision of the plan, the faculty and librarians reached a balanced compromise that included both basic and EBD-focused information skills.

Librarians also leveraged the expertise of the Boston University Center for Excellence in Teaching (CET). Approximately one month prior to the official training, the librarians taught the complete lesson for the CET director, who then offered constructive feedback on teaching styles and the overall lesson plan. This process improved the training considerably.

## TRAINING

### Faculty training

Prior to the student training, the BUSDM faculty were trained by librarians. As Haden et al. point out, "faculty development is not optional—it is a necessary condition for change and innovation in dental educa-

tion" [4]. Team-taught by two librarians, this ninety-minute hands-on faculty training reached fifteen faculty members, who were granted continuing education credits for participating. This training was requested by BUSDM administration to synchronize the information skills of the BUSDM faculty and first-year students and to further infuse EBD across the curriculum. The training was based on the rationale that faculty members familiar with information resources and confident in their skills would more likely integrate EBD information resources into their courses.

The faculty training employed the lesson plan designed for the student training, which allowed the librarians to test technology, integrate feedback from the CET, run search examples, and become familiar with the training materials. This session also acquainted the librarians with the specialized vocabulary used by faculty for dental concepts introduced in the periodontal disease case, providing an opportunity for further refinement of the content of the student training. In addition to these logistical benefits, the training was valuable because it allowed the librarians to demonstrate their teaching abilities, showcase library's resources, and interact with busy teaching faculty.

### Student training

In October 2006, 5 librarians conducted 12 ninety-minute hands-on EBD skills sessions over a period of 2 days in 3 computer labs. All students had access to a computer during the training. These combined resources enabled all 115 first-year students to be trained in groups of 10 to 12 over 2 days, during which all other BUSDM classes were cancelled.

Due to the students' varying information literacy levels, the training began with a basic search demonstration using the Ovid MEDLINE system and was designed to provide students with a baseline understanding of searching. Following this demonstration, the assignment was introduced using online forms created by the library's web coordinator. These web pages included the case and input fields for the student's patient, intervention, comparison, and outcome (PICO) and clinical questions. Upon completion of the in-class assignment, students electronically submitted their assignments to the BUSDM faculty for grading. Because the assignment focused on PICO and clinical question formation, BUSDM faculty and the librarians decided that, as subject experts, it was appropriate for the BUSDM faculty to grade the assignments.

Following the assignment, students volunteered their PICO and clinical questions. The librarians then guided students to the BUSDM's "gold standard" clinical question. Once a searchable clinical question was formed, the students researched the question using the Ovid MEDLINE system and techniques introduced earlier. During this time, the librarian circulated through the classroom, answering questions and providing suggestions for improving the students' searches. After approximately ten to fifteen minutes, the students were asked to present their strategies. Using the SMART SynchronEyes classroom management soft-

**Table 2**

Student responses to the evaluation question, "The time spent in the library training was worthwhile"

	Frequency	Percent
Strongly agree	53	46.1
Agree	48	41.7
Undecided	11	9.6
Disagree	2	1.7
Total	114	99.1
Missing	1	0.9
Total	115	100.0

ware, the librarian projected each volunteer's search on the main teaching screen. This exercise was well received by both students and librarians. In several cases, the librarians found that projecting student searches provided natural teaching moments by allowing the introduction of valuable information that may not otherwise have been covered. Additionally, librarians found that this component generated high levels of student conversation and interest.

## EVALUATION

In the session's final five minutes, librarians distributed evaluations created by the BUSDM Office of Education Research and Evaluation (OERE), a step that again mirrored a faculty-led course (Appendix online). Completed by all 115 students, these evaluations were collated by the OERE and provided general feedback on the training and each library instructor. Table 2 provides a sample of the evaluation results. The authors acknowledge that these evaluations represent self-reported data and have plans to enhance the assessment to collect objective evidence of the training's efficacy.

## CURRENT STATUS AND FUTURE DIRECTIONS

The future looks bright for increased collaboration between BUSDM and the library. For example, librarians were invited to provide increased training to students and faculty during the 2007/08 academic year. This training will include an additional ninety-minute mandatory hands-on basic information skills training for all first-year students, allowing more advanced EBD search techniques to be introduced in the subsequent EBD session. In addition to increased training opportunities, the information services and education librarian has joined several curriculum subcommittees, which has been valuable in keeping the library's education program current and relevant. For example, during a committee meeting, the BUSDM faculty communicated that the school was adopting a case-based curriculum and that cases were to be paper based. With this knowledge, the librarians volunteered to host BUSDM cases on their website with the value-added feature of linked relevant information resources. The BUSDM faculty enthusiastically accepted this offer, and the project is ongoing.

## CONCLUSION

Through its 2001 policy statement, the ADA made EBD a priority and identified the ability to formulate clinical questions and search the literature as essential steps in this process [1, 2]. This top-level emphasis on developing information skills provides opportunities for librarians serving dental schools to offer their unique expertise [5]. While the authors acknowledge that their experience may not be directly transferable to other libraries, this collaboration suggests several ideas for those considering similar initiatives. For example, librarians seeking to begin such collaborations should identify key players at their dental schools and actively pursue all opportunities, ranging from serving on curriculum committees to offering faculty research assistance. Additionally, librarians should propose a realistic integration plan—incorporating librarian, faculty, and student perspectives on key skills—and be flexible to changes suggested by their collaborators. Also, looking internally at their own departments, librarians should ensure that they have administrative support, as demands on staff and resources may be extensive. In the current project, for example, librarians dedicated more than fifty hours preparing and teaching the BUSDM training sessions. Lastly, librarians should identify unique value-added elements, such as online support, to demonstrate their ability to move beyond traditional library services and generate enthusiasm for library and faculty collaboration. Just as librarians play essential roles in helping medical schools meet medical accreditation requirements [6], they can also help dental schools integrate the EBD process defined by the ADA.

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## Diabetes mellitus publication patterns, 1984–2005

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## INTRODUCTION

An established disorder recognized for over 2 millennia [1], diabetes mellitus most commonly occurs as type 1 diabetes, in which the body does not produce insulin, or type 2 diabetes, in which the body cannot properly utilize the insulin it produces [2]. In 2005, 15.8 million people in the United States had been diagnosed with diabetes, a sharp increase from 5.9 million in 1984 [3]. These changes in the number of people with diabetes are due in part to the growing numbers of people with type 2 diabetes. To assess how such changes in the prevalence of diabetes might be affecting literature published on the subject, this study examined patterns of publication of diabetes literature indexed in MEDLINE between 1984–2005, contrasted with disease statistics.

## BACKGROUND

Publication pattern studies most often focus on an emerging disease, such as Bierbaum's [4] or Pratt's [5] work on AIDS, rather than on an established disease such as diabetes. Typically, a study of publication patterns observes the start of the literature on the subject, not the changes in an established field of study.

Gupta indicated that understanding the direction of literature, or key areas of growth or decline, enhances understanding of changes in the field [6]. Previous bibliometric studies that have focused on diabetes have highlighted aspects of the literature including locating

diabetes epidemiology-related publications [7], author self-citation [8], and portrayal of diabetes in the media [9] or a specific journal [10]. However, no previous studies have looked at the overall pattern of publication.

MEDLINE has been used for bibliometric studies similar to this examination of publication patterns in areas such as acupuncture [11] and mother-child health care [12], utilizing the database to find trends in the field as determined by both Medical Subject Heading (MeSH) assignment and associated terms. Both these studies and the present one aimed to find trends in established fields utilizing MEDLINE and MeSH.

## RESEARCH QUESTIONS AND ASSUMPTIONS

The current study addresses three hypotheses:

- Diabetes mellitus publication over a twenty-one-year time-span, 1984 to 2005, would show an overall positive growth, both in number of publications and number of articles indexed in MEDLINE each year.
- The publication pattern of articles about diabetes would parallel the increase in diagnosed cases of diabetes mellitus (types 1 and 2 combined), with the growth of the literature offset a few years from the changes in the population.
- Publication on type 2 diabetes mellitus would increase, and publication on type 1 diabetes mellitus would decrease as type 2 diabetes cases increased.

Three assumptions also underlie this research: (1) articles indexed in MEDLINE are representative of all articles published in this field. All types of indexed articles (e.g., letters, clinical trials, reviews, etc.) in any language were included to address all interest in the topic. (2) Articles with the search terms in the major heading field are directly related to diabetes mellitus, type 1 or type 2, and not just tangentially associated. (3) The number of diagnosed diabetes mellitus cases reported by the US Centers for Disease Control and Prevention (CDC) is an accurate representation of the diagnosed population with the disease in the United States.

## METHODS

The 1984 start date of the study was chosen because the indexing terms "Diabetes Mellitus, Type 1" and "Diabetes Mellitus, Type 2" were implemented as MeSH terms in 1984 and have continued to be in use from that time on. CDC information on diagnosed cases of diabetes, at the time of this study, was only available through 2005.

PubMed searches were conducted to determine the number of publications for each year of the 1984 to 2005 timeframe for all types of articles containing the terms "Diabetes Mellitus," "Diabetes Mellitus, Type 1," and "Diabetes Mellitus, Type 2" in the MeSH major subject heading field. Searches limited to the MEDLINE subset and publication year were conducted to determine the number of articles published per year and indexed in MEDLINE. All searches were con-

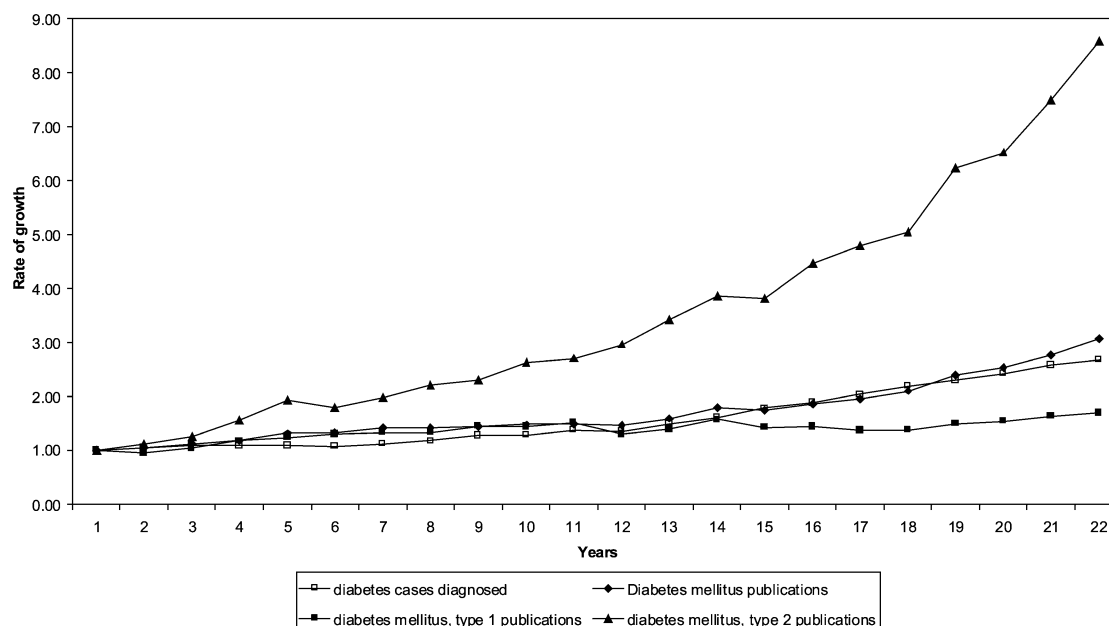


Supplemental Table 1 and Figures 1, 2, and 3 are available with the online version of this journal.



**Figure 4**

Growth rate of publications and cases



ducted in October of 2007. Figure 1 (online) describes all searches conducted. Numbers of the population diagnosed with diabetes mellitus from 1984 to 2005 were obtained from CDC data. Excel spreadsheets were utilized for both recording the data and evaluating the hypotheses.

## RESULTS

Analysis of the data confirmed hypothesis one: diabetes publications—as represented by articles indexed with “Diabetes Mellitus,” “Diabetes Mellitus, Type 1,” or “Diabetes Mellitus, Type 2” in the MeSH major field—increased from 2,973 publications in 1984 to 9,107 in 2005. In this time frame, such diabetes publications increased a total of 0.46%, as a proportion of total MEDLINE articles, rising from 0.97% in 1984 to 1.43% in 2005. While the number of such diabetes articles or articles as a percentage of MEDLINE did not steadily increase each year, there was overall growth (Figure 2). In addition, the number of articles added to MEDLINE each year also grew annually, with more than 300,000 more articles indexed in the 2005 year than in 1984 (Table 1 online).

Publication on diabetes showed a similar rate of growth as the total population of diagnosed cases, which partially validates hypothesis two, because the growth rate was similar but did not demonstrate a lag in increase of publication (Figure 3). Hypothesis three—publication on diabetes mellitus, type 2, would increase as diabetes mellitus, type 1, publications decreased—was shown to be only partially true. Publications with diabetes mellitus, type 2, as a MeSH major heading increased from 390 to 3,351 publications per year between 1984 and 2005, an increase of more

than 700%. During the same time, diabetes mellitus, type 1, publications increased 70%, with 698 more publications in 2005 than in 1984 (Figure 4).

## DISCUSSION

The three hypotheses of this research were validated to a great extent as the expected increases in publications addressing “Diabetes Mellitus,” as indicated by MeSH indexing, occurred. In comparison to all the literature indexed in MEDLINE, the diabetes publications represent a larger portion in 2005 than they did in 1984.

As the population of people with diabetes has been steadily increasing throughout the last two decades [3], it was expected that the number of publications would parallel the rise in the population affected with the disease, with some offset due to the research and publication process. The data showed that the publications on the topic were experiencing growth similar to the population of diagnosed cases, without the expected lag time. This similarity in the growth pattern of the literature and the affected population suggested that research might be a factor in both identifying those with the disorder and maintaining their lives for longer periods of time.

Given the increases in number of diagnosed cases annually, it was expected that “Diabetes Mellitus, Type 2” publications would increase and the “Diabetes Mellitus, Type 1” publications would decrease. While the type 2 publications showed a marked increase, type 1 publication did not decrease but have been consistent since the early 1990s. The steady research on type 1 diabetes might be due to advances in the study of genetics. Understanding of genetic factors

is a driving force behind research in aspects related to many disorders including type 1 and type 2 diabetes mellitus [13].

While this study's data illustrated strong growth in diabetes-related literature in MEDLINE, the study was limited by several factors. Though US data on diabetes cases were used, global diabetes publication data were used, given the difficulty in effectively limiting searches to US publications only. While research findings could certainly be put to use regardless of country of origin, this dissimilarity in the data sources might result in the appearance of similar growth rates that were not present in actuality.

In addition, this study employed data on diagnosed cases of diabetes. Factoring in undiagnosed cases, predicted to be a significant problem in studies of US men [14], likely would substantially increase the number of affected individuals. Another factor that might have influenced the growth rate of publications in this study was changes in MEDLINE, due to the addition of periodicals. Changes in publication data seen in this study were likely subject to alterations in journals themselves, such as increasing or decreasing numbers of publications in existing MEDLINE-indexed periodicals, as well as new periodicals being indexed in MEDLINE. Finally, this study employed only descriptive statistics, such as frequencies, rather than formal hypothesis testing. Additional research would need to be conducted to further explore the hypotheses examined here.

## CONCLUSION

Increasing diabetes prevalence in the United States is largely due to increases in cases of type 2 diabetes, a trend that is attributed to lifestyle changes in recent decades that include higher fat intake and lower activity levels [15]. Given the huge increase in the number of cases of diabetes in the last 21 years, it would be expected that research would increase and subsequently the number of publications on the subject would increase. This study's data help to confirm that diabetes, specifically type 2 diabetes, is increasingly a subject of research.

The change in the population of diabetes patients and the similar change in publication indicate that the population and publication may be connected. Additional research could examine changes in the frequency of MeSH subheadings associated with diabetes mellitus to help clarify facets of the disease at the foundation of the growth of diabetes publication. For example, growth in publications associated with subheadings such as "Diagnosis," "Prevention and Control," and "Therapy" could indicate an association between the number of people with diagnosed cases and publications related to identifying and maintaining the health of the population. Further study could also examine the literature of other diseases to investigate disease prevalence or associations between research funding increases and decreases and the rate of literature publication to further illuminate possible connections between population and publication. Re-

search could also examine global rates of diabetes, which are potentially increasing faster than anticipated [16], and literature publication rates.

Finally, future studies could focus on changes in the core journals in the area of diabetes research to help elucidate changes in research focus. Such an understanding of changes occurring in a disease population can be a valuable aid for both librarians and clinicians in finding appropriate information and anticipating the direction of research and future publications.

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## Materials employed by medical students preparing for subject examinations: supporting collection development

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## INTRODUCTION

Medical students in the United States are tested extensively throughout their four years of medical school, including both regular course examinations and standardized tests. The first standardized examination encountered by US medical students is the United States Medical Licensing Examination (USMLE) step one, produced by the National Board of Medical Educators (NBME), taken upon completion of the second year of training. Passing this examination is a significant milestone in the medical school curriculum, as most schools require students to pass before promotion to the third year [1].

The NBME produces not only the USMLE step exams but also produces standardized “subject examinations” [2]. In the United States, the American Association of Medical Colleges' (AAMC) Curriculum Management Information Tool (CurrMIT) database reports that 85% of US medical schools require their students to take subject examinations and pass them as a requirement to complete core clerkships [1]. At the University of Illinois College of Medicine located in Urbana-Champaign, students are required to pass subject examinations at the end of each core clerkship, occurring during the third and fourth years of medical

school: family medicine, internal medicine, obstetrics and gynecology, surgery, psychiatry, and pediatrics. The subject examinations also serve in part to prepare students for the capstone examination to graduation and the granting of the medical doctor (MD) degree, the USMLE step two.

Standardized examinations do not end with the granting of the MD. Resident physicians undergo a third and final board examination, the USMLE step three, after completion of the first year of residency training. Passing this examination in many states will earn resident physicians their permanent medical license [1]. Even after residency, passing standardized examinations continues to be a responsibility of practicing physicians. Many US hospitals only issue privileges to “board certified” (The American Board of Medical Specialties) physicians. Internists, for example, must pass the American Board of Internal Medicine on a recurring basis to maintain board certification status. Thus, test preparation retains its importance throughout a physician's career.

## TEST PREPARATION STRATEGIES

In a 1998 survey of students who took the step one exam, Thadani found that 98% had used commercial review books [3], suggesting the relevance of these materials for students. The popularity of these books is also reflected by the number and variety that are currently available. Some book series include Blueprints, High-Yield, Underground Clinical Vignettes, Board Review Series (BRS), National Medical Series (NMS), and PreTest. Zhang investigated factors affecting performance on the USMLE step one exam, including participation in commercial test preparation courses versus independent study. This research indicated that, among those students who did not enroll in the commercial test preparation course, most felt that independent study was an efficient use of their time [4]. The study also found that “personal learning habits and advice from other students were the two most important factors” affecting students' decisions on how to prepare for the exam [4]. This type of peer advice occurs at the University of Illinois College of Medicine with the yearly distribution of student-to-student advice regarding the USMLE step one examination process. The advice is given to students in a hard copy format and is available to students on a secure web page.

Students can and do use review materials throughout all four years of medical school. Many of the basic science courses in medical school curricula utilize standardized exams such as the basic science subject exam, which is administered more than 30,000 times annually [5]. Standardized exams are also used in the clinical years to ensure students progress from basic science to clinical science in preparation for graduate medical education. Many of the review resources are designed and heavily used for the specific subject areas of clinical rotations. Given the importance and extensive use of these exams in progressing through the

 Supplemental Tables 2 and 3 are available with the online version of this journal.



curriculum, access to review and study materials is of utmost importance to medical students.

At the Library of the Health Sciences at the University of Illinois, librarians and staff have observed that exam review materials are among the most highly requested resources by medical students, although this subject is not covered in the library literature and the medical education literature has very little coverage.

The purpose of the current study was to document the use of exam review materials by students during their clinical rotations in the third and fourth years of medical school. This information will enhance the ability of college of medicine faculty to advise students by providing them with information about the usefulness and popularity of various study aids during clinical rotations. The results of this study may also assist librarians in collection development decisions and in recommendations to students during reference transactions. This study was composed of two segments:

1. third- and fourth-year students were surveyed regarding their exam preparation choices
2. usage patterns were documented for library-owned exam review materials

## METHODS

### Survey

The University of Illinois College of Medicine has four campuses. The subjects of this study were those students enrolled in the clinical program of the Urbana campus (approximately 100 students).

The authors developed a very simple instrument that was distributed over the period of eighteen months (July 2004–December 2005) to students in each clinical rotation immediately before beginning each subject examination. Institutional review board approval was obtained for this survey, and students were asked to voluntarily offer the information requested in the brief questionnaire. Students were given the survey each time they sat for a subject examination and may have been given this survey multiple times over the eighteen-month period of the research. The questions in the survey were open-ended to provide students the ability to give the researchers as much information as they were willing. Students were asked to comment on the following:

- What subject examination are you taking?
- What resource(s) did you use to prepare?
- What worked for you in preparation for the subject examination?
- What didn't work for you in your preparation?
- Any other tips you'd like to give future students?

### Circulation records

The library actively collects materials in the area of exam review and preparation to meet the needs of the medical students. Since 2002, the library's collection policy has been to purchase at least two copies of each exam review book, placing one copy in the book stacks, which are available to all users and can be checked out for two weeks. Additional copies of books

are placed on open reserve. The open reserve collection is limited to medical students, and the circulation period is shorter (1 week).

Circulation statistics were extracted from the online catalog system for exam review books published in the years 1995 to 2006. Books in the selected call number ranges were reviewed from both the open reserve and book stacks collections. Exam review books are typically classified in the 18.2 area (Educational Materials) under the National Library of Medicine classification [6]. For example, in the case of pediatrics, books in the WS 18.2 range of the collection were reviewed; for surgery, books in the WO 18.2 range were reviewed.

Additional searches based on Medical Subject Headings (MeSH) were performed in the library's online catalog to create a representative sampling of exam review materials in each of the core clerkship areas, with the exception of family practice. At the time of this study, family practice was not included as students typically used information from all the other clinical areas—including medicine, pediatrics, psychiatry, surgery, and obstetrics/gynecology—to prepare for this examination. The NBME has changed this examination recently and made it more specific to family practice, so the need for student preparation using materials specific to family practice will likely be seen in future studies in this area.

Next, the circulation record for each exam review book was examined to note the total number of historical charges (the number of times a book was checked out and/or renewed) and browses (in-house uses). Circulation data were collected during January and February 2007. The data pertain to charges from January 2002 to the time of data collection (January–February 2007). The charges were tallied by subject area and by book series.

## RESULTS

Ninety-five students (43%) sitting for subject examinations responded, out of a possible 222. By discipline, the responses were: 12 students responded to the family medicine preparation survey; 13 students responded to the internal medicine preparation survey; 22 students responded to the obstetrics and gynecology preparation survey; 12 students responded to the pediatric preparation survey; 18 responded to the psychiatry preparation survey; and 18 responded to the surgery preparation survey (Table 1).

The students reported using a wide variety of resources and the popularity of the publishers' series varied by discipline. These data were also confirmed by library circulation results (Tables 2 and 3 online).

## DISCUSSION

It is important to understand the multiple and high-stake assessment methods that take place during and after medical school to provide appropriate resources at the most useful time during the curriculum. The results of this study confirm that exam review mate-

**Table 1**  
Survey results: reported use of materials by students

Internal medicine		OB/GYN		Pediatrics		Psychiatry		Surgery clerkship	
Resource	Number reporting use	Resource	Number reporting use	Resources	Number reporting use	Resources	Number reporting use	Resources	Number reporting use
Blackwell's Clinical Vignettes	1	Blueprints	15	Blueprints Pediatrics	6	Blueprints Psychiatry	9	Blueprints Surgery	7
Case File	2	Board Review Series (BRS) OB	1	Case Files	3	BRS Psychiatry	1	Cecil's Textbook	1
Cecil	1	First Aid	3	E-Bay Peds Case Files	1	Cecil	1	First Aid	5
Davidson's Principles of Medicine	1	Hacker & Moore	2	First Aid	4	First Aid	15	High Yield	2
First Aid	5	High Yield	11	Kaplan	3	High Yield Psychiatry	2	Kaplan	3
Harrison's Board Prep Questions	1	Kaplan	4	Lange	2	Lange	11	Lange	9
High Yield Internal Medicine	2	Lange	1	National Medical Series (NMS) Questions	5	NMS	1	Lawrence Textbook	7
Kaplan	1	Pretest	13	Pretest Pediatrics	6	Pretest Psychiatry	8	MKSAP	1
Medical Knowledge Self Assessment Program (MKSAP)	10	Surgical Recall	1					Pretest—Surgery	11
Pre-Test Medicine	2							Surgical Recall	10
Step-Up Medicine	2								

rials are highly valued and used by medical students. Both the results of the survey and the library data collection showed that medical students used a variety of resources to prepare for the subject examinations. Students reported in questionnaires that review materials, in addition to the actual clerkship experiences, were essential in preparing for subject examinations.

It is important to note that the extensive use of the survey instrument may have become tiresome to the subjects of this study, given that some students may have answered the same questions at different subject examinations over an eighteen-month period. Therefore, their answers might have become shorter over time. Those surveys answered near the end of the project may not contain the same depth of information as those answered in the beginning of the research period.

Overall, the Appleton & Lange, High Yield, and Underground Clinical Vignettes were the most popular series, followed closely by PreTest, according to the circulation data, although these results varied by clerkship rotation. The results should be considered with caution, as the number of books in the collection and corresponding publication years varied. For example, a book published in 2000 would likely show more use than one published in 2006. Also, while the circulation data sampling technique captured the majority of review books in the collection in the scope of the study (1995–2006), students might also have been using other library materials not reflected in the current usage data sample. However, the results clearly showed that a variety of exam review materials were used by the students.

The library data do not account for books that stu-

dents purchased themselves or library books that students may share with each other. It is also important to note that this study was limited to commercial publications. Some schools may develop their own unique resources for exam review that are not available commercially. Also, students may utilize commercial coaching courses, particularly for USMLE step one, two, and three examinations. However, it is not clear if commercial courses are superior to independent study. Werner and Bull found that students taking these three-to-four-week courses performed similarly to those who prepared for USMLE step one on their own [7], while Thadani found "little or no evidence of achievement of higher scores as a consequence of using commercially prepared material" versus other methods, such as student-to-student produced study materials and study materials gleaned from previous coursework [3]. These previous studies along with the results from the current study provide evidence supporting the popularity and usefulness of exam review books among medical students.

## CONCLUSION

In light of the wide variety of learning styles exhibited by students, it comes as no surprise that multiple resources in a variety of formats would be employed in preparing for these high-stakes examinations. Those resources with the greatest usage may vary by clerkship area and by availability of materials.

Given the popularity of exam review materials, medical libraries supporting medical school curricula may want to provide students with access to a wide array of sources in this area to meet the needs of stu-

dents with varying learning styles. Being aware of the schedule of exams, both the step exams and the subject exams, as well as the consequences of these tests is important information for medical librarians. Libraries can do much, not only in providing these materials, but in promoting them to students at the times when they are most needed.

As exam review preparation is vital to medical students but the literature is scant in this area, future reports might include studies of online exam review materials, other techniques students use to prepare, and techniques or resources that were not successful for students.

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